

CLAIMS

1. A method of detecting a biomolecule, comprising reacting a biomolecule sample with an organic EL-dye and measuring the fluorescence of the biomolecule sample
5 labeled with the organic EL-dye.

2. The detection method according to claim 1, wherein an amide bond, imide bond, urethane bond, ester bond, guanidine bond or thiourea bond is formed between said
10 organic EL-dye and said biomolecule.

3. The detection method according to claim 2, wherein prior to reaction with said biomolecule, any one reactive group selected from the group consisting of an isocyanate
15 group, isothiocyanate group, epoxy group, halogenated alkyl group, triazine group, carbodiimide group and active ester carbonyl group is introduced into said organic EL-dye.

4. The detection method according to claim 1, wherein
20 any one selected from the group consisting of nucleic acids, proteins, peptides and saccharides is used as said biomolecule sample.

5. A method of detecting a biomolecule, comprising
25 labeling of a biomolecule sample with a labeling dye

comprising a 5-membered ring compound having a conjugate system and containing one or more hetero atom(s), selenium atom(s) or boron atom(s) and measurement of the fluorescence of the labeled biomolecule sample.

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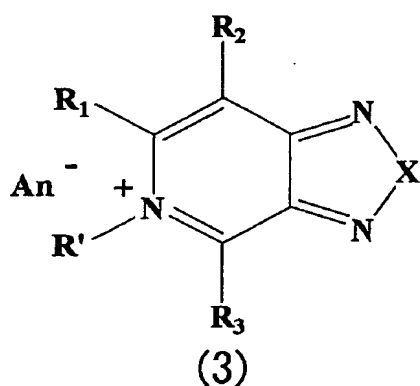
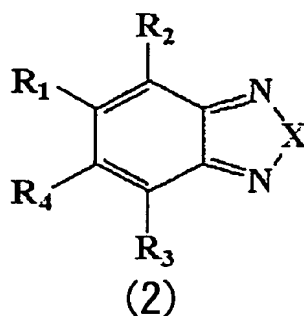
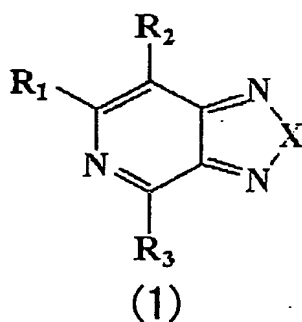
6. The detection method according to claim 5, wherein said labeling dye comprises a condensed poly-ring compound consisting of said 5-membered ring compound and a 6-membered ring compound having a conjugate system.

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7. The detection method according to claim 5, wherein said 5-membered ring compound is an azole derivative or imidazole derivative.

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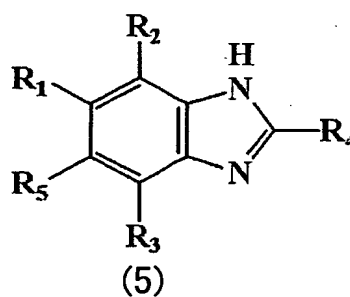
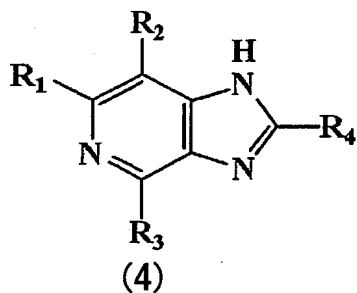
8. The detection method according to claim 7, wherein said azole derivative is a compound of the following general formula (1) , (2) or (3):

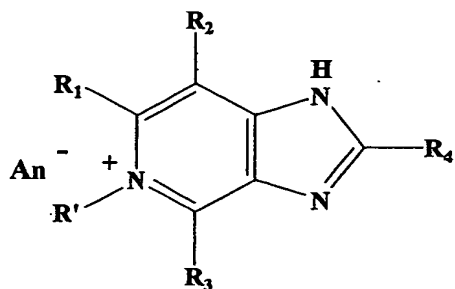


(wherein, R_1 , R_2 , R_3 and R_4 represent each independently an aromatic hydrocarbon group, hydrocarbon group, heterocyclic group or aromatic group containing a hetero atom in the ring, optionally having a substituent such as a hydrogen atom, halogen atom, hydroxyl group, cyano group or sulfonyl group and the like, and X represents a nitrogen atom, sulfur atom, oxygen atom or selenium atom, optionally having a substituent. R' represents an alkyl group optionally having an aromatic ring, aliphatic hydrocarbon group such as alkenyl group or aromatic hydrocarbon group. An^- represents halide ions such as Cl^- ,

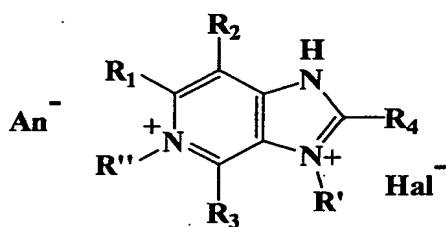
Br- and I-, CF_3SO_3^- , BF_4^- or PF_6^-).

9. The detection method according to claim 7, wherein
said imidazole derivative is a compound of the following
5 general formula (4), (5), (6), (7) or (8):

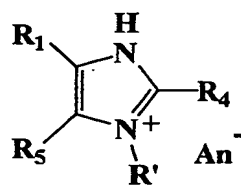




(6)



(7)



(8)

(wherein, each of R_1 , R_2 , R_3 , R_4 and R_5 represents an aromatic hydrocarbon group, hydrocarbon group, heterocyclic group or aromatic group containing a hetero atom in the ring, optionally having a substituent such as a hydrogen atom, halogen atom, hydroxyl group, cyano group or sulfonyl group and the like, and R_1 , R_2 , R_3 , R_4 and R_5 may be the same or different. R' and R'' represent an alkyl group optionally having an aromatic ring, aliphatic hydrocarbon group such as alkenyl group or aromatic hydrocarbon group. An^- represents halide ions such as Cl^- , Br^- and I^- , $CF_3SO_3^-$, BF_4^- or PF_6^-).

wherein prior to reaction with said biomolecule, any one reactive group selected from the group consisting of an isocyanate group, isothiocyanate group, epoxy group, halogenated alkyl group, triazine group, carbodiimide group and active ester carbonyl group is introduced into said organic EL-dye.

11. A labeling dye used for detecting a biomolecule by measurement of fluorescence, wherein the dye includes an organic EL-dye having a reactive group to bind to a biomolecule.

12. The labeling dye according to claim 11, wherein said reactive group is any one selected from the group consisting of a carboxyl group, isocyanate group, isothiocyanate group, epoxy group, halogenated alkyl group, triazine group, carbodiimide group and active ester carbonyl group.

13. The labeling dye according to claim 11, wherein said organic EL-dye is a compound containing a 5-membered ring compound having a conjugate system in which the 5-membered ring compound contains one or more hetero atom(s), selenium atom(s) or boron atom(s).

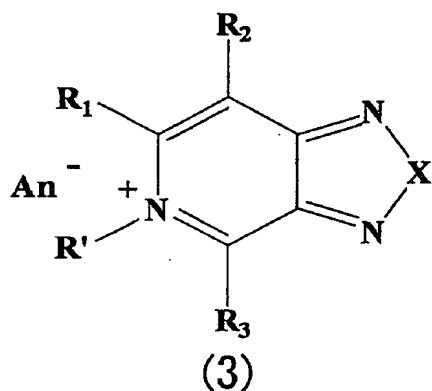
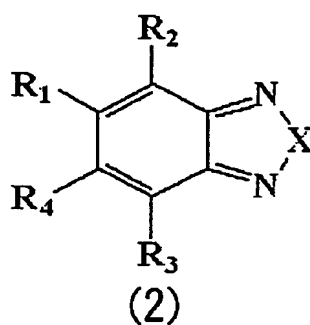
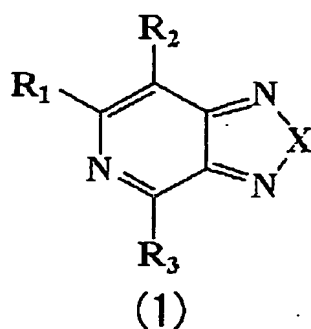
14. The labeling dye according to claim 13, wherein said organic EL-dye is a condensed poly-ring compound consisting of said 5-membered ring compound and a 6-membered ring compound having a conjugate system.

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15. The labeling dye according to claim 13, wherein said condensed poly-ring compound is an azole derivative or imidazole derivative.

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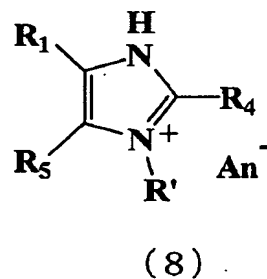
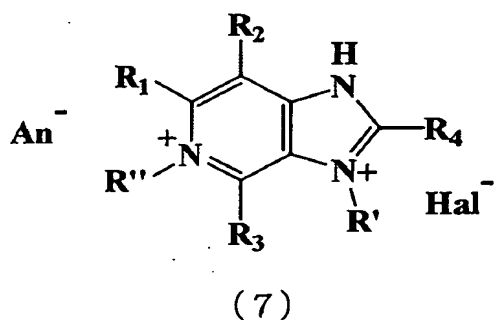
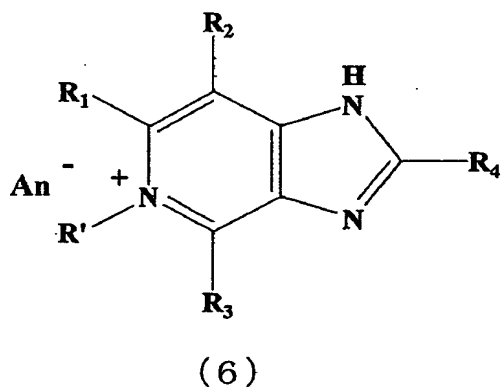
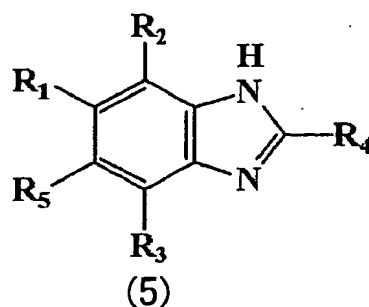
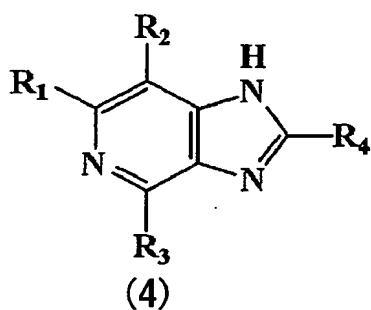
16. The labeling dye according to claim 15, wherein said azole derivative is a compound of the following general formula (1) , (2) or (3):



(wherein, R_1 , R_2 , R_3 and R_4 represent each independently an aromatic hydrocarbon group, hydrocarbon group, hetero-
 5 cyclic group or aromatic group containing a hetero atom in the ring, optionally having a substituent such as a hydrogen atom, halogen atom, hydroxyl group, cyano group or sulfonyl group and the like, and X represents a nitrogen atom, sulfur atom, oxygen atom or selenium atom,
 10 optionally having a substituent. R' represents an alkyl group optionally having an aromatic ring, aliphatic hydrocarbon group such as alkenyl group or aromatic

hydrocarbon group. An-represents halide ions such as Cl⁻, Br⁻ and I⁻, CF₃SO₃⁻, BF₄⁻ or PF₆⁻).

17. The labeling dye according to claim 15, wherein
5 said imidazole derivative is a compound of the following general formula (4), (5), (6), (7) or (8):



(wherein, each of R₁, R₂, R₃, R₄ and R₅ represents an aromatic hydrocarbon group, hydrocarbon group, hetero-cyclic group or aromatic group containing a hetero atom in the ring, optionally having a substituent such as a hydrogen atom, halogen atom, hydroxyl group, cyano group or sulfonyl group and the like, and R₁, R₂, R₃, R₄ and R₅ may be the same or different. R' and R'' represent an alkyl group optionally having an aromatic ring, aliphatic hydrocarbon group such as alkenyl group or aromatic hydrocarbon group. An-represents halide ions such as Cl⁻, Br⁻ and I⁻, CF₃SO₃⁻, BF₄⁻ or PF₆⁻).

18. A labeling kit for biomolecule, comprising an organic EL-dye for labeling a biomolecule.

19. The labeling kit according to claim 18, wherein said organic EL-dye has any one reactive group selected from a carboxyl group, isocyanate group, isothiocyanate group, epoxy group, halogenated alkyl group, triazine group, carbodiimide group and active ester carbonyl group.

20. The labeling kit according to claim 18, wherein said organic EL-dye is a compound containing a 5-

membered ring compound having a conjugate system in which the 5-membered ring compound contains one or more hetero atom(s), selenium atom(s) or boron atom(s).

5 21. The labeling kit according to claim 18, wherein said organic EL-dye is a condensed poly-ring compound consisting of said 5-membered ring compound and a 6-membered ring compound having a conjugate system.

10 22. A method of detecting a biomolecule, comprising reacting a biomolecule sample and a probe labeled with an organic EL-dye and measuring the fluorescence of the biomolecule sample labeled with the organic EL-dye.

15 23. The detection method according to claim 22, wherein said biomolecule sample is a nucleic acid and said probe is an oligonucleotide or PNA having a base sequence complementary to said nucleic acid.

20 24. The detection method according to claim 23, wherein said oligonucleotide is a primer or terminator, and the fluorescence measurement is carried out after amplifying the nucleic acid.

25 25. The detection method according to claim 24,

wherein said primer is labeled with the organic EL-dye prior to amplifying the nucleic acid.

26. The detection method according to claim 23
5 wherein said oligonucleotide or PNA is a molecular beacon.

27. A method of detecting a biomolecule, comprising
size separating a biomolecules sample by electrophoresis,
wherein the biomolecule sample is labeled with an organic
10 EL-dye prior to the electrophoresis or after the
electrophoresis.

28. The detection method according to claim 27,
wherein said biomolecule sample is a nucleic acid and base
15 sequence(s) of the nucleic acid is determined based on the
electrophoresis image of the labeled nucleic acid.

29. The detection method according to claim 27,
wherein said biomolecule sample is a protein and the
20 protein removed from the sample based on the
electrophoresis image is identified by mass analysis.

30. A method of dyeing tissues or cells, comprising
labeling a biomolecule in tissues or cells with an organic
25 EL-dye.

31. The dyeing method according to claim 30, wherein said biological molecule is a nucleic acid or protein.

5 32. A chromatic dye used for dyeing tissues or cells, comprising an organic EL-dye having reactive groups to bind with a biomolecule of tissues or cells.